



Department of Irrigation Engineering and Hydraulics

The department of Irrigation Engineering and Hydraulics offers the following programs:

1. Graduate Diploma

1.1 Specialized Graduate Diploma in Irrigation Structures

The student must complete 30 credit hours.

Compulsory courses: The student must complete the following 7 courses equivalent to 21 credit hours.

(07 05 611 to 07 05 616 and 07 05 601)

Elective courses: The student can choose the remaining 3 courses (9 credit hours) from courses: (07 05 621 to 07 05 627).

1.2 Specialized Graduate Diploma in Water Resources Engineering

The student must complete 30 credit hours.

Compulsory courses: The student must complete the following 6 courses equivalent to 18 credit hours.

(07 05 611 to 07 05 616 and 07 05 602)

Elective courses: The student can choose the remaining 3 courses (9 credit hours) from courses: (07 05 631 to 07 05 636).

2. Master Degrees

2.1 Master of Engineering in Irrigation Engineering and Hydraulics

The student must complete 30 credit hours in the form of courses and an additional 3 credit hours in the form of a scientific report.

Compulsory courses: The student must complete the following 6 courses equivalent to 18 credit hours from the following:

(07 05 711 to 07 05 716)

Elective courses: The student can choose the remaining 4 courses (12 credit hours) from courses: (07 05 721 to 07 05 730).

The student is allowed to choose 2 courses from another major.

2.2 Master of Science in Irrigation Engineering and Hydraulics

The student must complete 24 credit hours in the form of courses and an additional 8 credit hours in the form of a thesis.



Compulsory courses: The student must complete the following 4 courses equivalent to 12 credit hours from the following:
(07 05 731 to 07 05 734)

Elective courses: The student can choose the remaining 4 courses (12 credit hours) from courses: (07 05 741 to 07 05 753).

The student is allowed to choose 2 courses from another major.

3. Doctor of Philosophy- Ph.D. Degree

3.1 Doctor of Philosophy in Irrigation Engineering and Hydraulics

The student must complete 18 credit hours in the form of courses and an additional 24 credit hours in the form of a dissertation.

Compulsory courses: The student must complete the following 3 courses equivalent to 9 credit hours from the following:
(07 05 811 to 07 05 813)

Elective courses: The student can choose the remaining 3 courses (9 credit hours) from courses: (07 05 821 to 07 05 827).

The student is allowed to choose 2 courses from another major.

For both M.Sc. and Ph.D. programs, two seminars are to be held by the student:

- i- First seminar (3-6 months after finishing course requirements). Suggested topic of the research, literature review and general outlines of the study should be presented.
- ii- Second seminar (2-3 months before selection of the examination committee). Final details of the study should be presented.

List of Diploma, Master and Ph.D. courses

Course Code	Course Name	Credit Hours	Exam Duration	Pre-requisites
Diploma Courses				
07 05 611	Engineering Hydrology	3	3	
07 05 612	Hydraulic, Hydrological and Environmental Measurements	3	3	
07 05 613	Design of Small Dams	3	3	



Course Code	Course Name	Credit Hours	Exam Duration	Pre-requisites
07 05 614	Planning and Construction of Irrigation and Drainage Projects	3	3	
07 05 615	Crop Water Requirements and Water Budget in Egypt	3	3	
07 05 616	Applied Hydraulics	3	3	
07 05 621	Design of Irrigation Structures for Small Canals	3	3	
07 05 622	Water Control Structures	3	3	
07 05 623	Pump Stations	3	3	
07 05 624	Scour Downstream Hydraulic Structures and Energy Dissipation Methods	3	3	
07 05 625	Computer Applications in the Design of Water Structures	3	3	
07 05 626	Canals and Drains Escapes	3	3	
07 05 627	Energy Dissipation behind Hydraulic Structures	3	3	
07 05 631	Analysis of Water Resources Systems	3	3	
07 05 632	Water Resources Pollution	3	3	
07 05 633	Environmental Impact of Irrigation and Drainage Projects	3	3	
07 05 634	Conservation and Optimization of Irrigation Water Use	3	3	
07 05 635	Computer Applications in Water Resources Studies	3	3	
07 05 636	Water Storage Projects	3	3	
	Master of Engineering (M.Eng.) Courses			
07 05 711	Flash Flood Hydrology and Protection Methods	3	3	



Course Code	Course Name	Credit Hours	Exam Duration	Pre-requisites
07 05 712	Canal Falls Structures	3	3	
07 05 713	Improvement of Irrigation Water Control and Management Systems	3	3	
07 05 714	Design and Execution of Agricultural Drainage Networks	3	3	
07 05 715	Shore Engineering and Protection	3	3	
07 05 716	Water Hammer (WH) in Pipelines and Protection Methods	3	3	
07 05 721	Water Environment Engineering	3	3	
07 05 722	Hydrological and Hydraulic Study of the River Nile	3	3	
07 05 723	Integrated Management (IM) and Sustainable Development (SD) of Irrigation Water Resources	3	3	
07 05 724	Design and Construction of Canal Lining	3	3	
07 05 725	Use of Pipe Systems For Irrigation Networks	3	3	
07 05 726	Dewatering Systems for irrigation and Drainage structures	3	3	
07 05 727	Stability of Canals and Drains Embankments	3	3	
07 05 728	Groundwater Hydrology	3	3	
07 05 729	Hydraulics of Wells	3	3	
07 05 730	Improved Irrigation Structures	3	3	
	Master of Science (M.Sc.) Courses			
07 05 731	Fluid Mechanics	3	3	
07 05 732	River Engineering and Sediment transport	3	3	
07 05 733	Statistical Analysis in Water Resources Engineering	3	3	
07 05 734	Computational Hydraulics	3	3	
07 05 741	Finite Element Method in Water Structures	3	3	



Faculty of Engineering
Alexandria University

Graduate Studies
Internal Bylaws 2011
Amended 2013

Course Code	Course Name	Credit Hours	Exam Duration	Pre-requisites
07 05 742	Unsteady Flow in open Channels	3	3	
07 05 743	Pipe Network Systems	3	3	
07 05 744	Design and Maintenance of Wells	3	3	
07 05 745	Wave Hydraulics	3	3	
07 05 746	Advanced Analysis of Irrigation and Drainage Systems	3	3	
07 05 747	Water Resources Pollution (Advanced)	3	3	07 05 632
07 05 748	Special Course	3	3	
07 05 749	Seepage in Hydraulic Structures	3	3	
07 05 750	Local Scour behind Hydraulic Structures	3	3	
07 05 751	Ground Water Modeling	3	3	
07 05 752	Hydraulics of Pumping Stations	3	3	
07 05 753	Hydraulics Measurements and Modeling	3	3	
	Doctor of Philosophy (Ph.D.) Courses			
07 05 811	Advanced Hydraulics	3	3	
07 05 812	Advanced Topics in Water Resources Engineering	3	3	
07 05 813	Water Basin Hydrology of Rivers	3	3	
07 05 821	Estuary Hydraulics	3	3	
07 05 822	Hydro Informatics	3	3	
07 05 823	Pipe Network Systems (advanced)	3	3	07 05 743
07 05 824	Water Management of Coastal Environment	3	3	
07 05 825	Economical, Environmental and Social Studies for Water Projects	3	3	
07 05 826	Statistical Analysis in Water Resources Engineering (Advanced)	3	3	07 05 733
07 05 827	Design of Irrigation Structures (Advanced)	3	3	
07 05 601	Diploma Project (Irrigation Structures)	3	Discussion	
07 05 602	Diploma Project (Water Resources Engineering)	3	Discussion	
07 05 701	Scientific Report (M.Eng.) in Irrigation	3	Defense	



Course Code	Course Name	Credit Hours	Exam Duration	Pre-requisites
	Engineering and Hydraulics			
07 05 705	M.Sc. Thesis in Irrigation Engineering and Hydraulics	8	Defense	
07 05 801	Ph.D. Dissertation in Irrigation Engineering and Hydraulics	24	Defense	

Description of Courses for Graduate Programs (Diploma- Master- Doctor of Philosophy)

07 05 611 Engineering Hydrology

Introduction. Hydrologic cycle. Precipitation. Evaporation. Evapo-Transpiration. Surface water. Sub-surface water.

07 05 612 Hydraulic, Hydrological and Environmental Measurements

Equipment and measurement methods of discharge, pressure, velocity and water levels in the laboratory and field. Weirs. Submerged orifice. Hydraulic models. Methods of measuring rainfall, runoff, evaporation and evapo-transpiration. Field measurements of canals cross sections. Ground water measurements.

07 05 613 Design of Small Dams

Types of small dams. Selection of type of dam. Foundations. Construction materials. Design of earth fill dams. Design of rock-fill dams. Design of concrete gravity dams. Spillways. Outlet works. Construction of dams. Operation and Maintenance.

07 05 614 Planning and Construction of Irrigation and Drainage Projects

Job planning and management. Factors affecting the selection of construction equipment. Soil stabilization and compaction equipment. Excavation equipment. Dewatering of the construction site. Pumping equipment. Cofferdams. Concrete mixing. Canal lining equipment. Piles and pile driving equipment. Sheet pilings and their driving equipment.

07 05 615 Crop Water-Requirements and Water Budget in Egypt

Crop-water-soil relationships. Crop water consumption. Leaching requirements. Conveyance, distribution, and field water losses. Irrigation scheduling. Water resources in Egypt: Present evaluation and future expectations, Development alternatives. Water requirements in Egypt: Present evaluation and future expectations, Conservation alternatives. Summary of present and future water budget.



07 05 616 Applied Hydraulics

Hydraulics and construction of pipe lines. Hydraulic transients in pipe lines. Secondary flow. Channel transitions. Inlets of pump stations.

07 05 621 Design of Irrigation Structures for Small Canals

Conveyance structures. Regulating structures. Protection structures. Measuring structures. Energy dissipaters. Protection against erosion.

07 05 622 Water Control Structures

Hydraulics and analysis of small dams, regulators and weirs. Site preparation. Construction methods.

07 05 623 Pumping Stations

Types of pump Stations. Main components. Dimensioning. Seepage underneath the structure. Design of superstructures. Design of Suction and delivery pools. Design of steel pipes. Effect of vibration on structure. Design of gates. Design of weed barrier. Collection of operational data. Valves and accessories. Main costs. Secondary costs. Depreciation, maintenance and operating costs .

**07 05 624 Scour Downstream Hydraulic Structures and Energy Dissipation
Methods**

Introduction. Phenomenon of local scour downstream hydraulic structures. Experimental modeling. Calculation of local scour. Protection measures. Hydraulics of flow in stepped weirs. Air mixing with flowing water. Design of stepped channels and chutes. Design of stilling basins. Design considerations for hydraulic structures to avoid local scour and tail erosion.

07 05 625 Computer Applications in Design of Water Structures

Programming of the hydraulic and structural design procedure of water retaining structures. Programming of the uplift pressure calculations.

07 05 626 Canals and Drains Escapes

Introduction. Operation methods (self-control, gated flow and combined flow). Separate escape. Combined escape. Intermediate escapes. Tail escapes. Self-control gates for tail escape.

07 05 627 Energy Dissipation behind Hydraulic Structures

Introduction. Classification of energy dissipaters. Type selection. Hydraulic jump characteristics. Hydraulic jump stilling basins. Contracted depth behind weirs and gates.



Hydraulics of flow over stepped weirs. Cavitation and air entrainment. Design of stepped and chute channels. Design of stilling basins. Trajectory buckets – Design considerations.

07 05 631 Analysis of Water Resources Systems

Availability of water – Quantitative and qualitative requirements of water – Application of systems-engineering concepts (linear and dynamic programming, probabilistic methods and simulation methods) in planning, design and operation of water resources systems.

07 05 632 Water Resources Pollution

Sources of pollution of surface and ground water resources– Necessary precautions and structures for preventing pollution – Environment protection laws.

07 05 633 Environmental Impact of Irrigation and Drainage Projects

Impact of storage projects on the environment – Impact of irrigation and drainage projects on the local society.

07 05 634 Conservation and Optimization of Irrigation Water Use

Water budget in Egypt and water deficit problem – Irrigation water losses – Improvement of irrigation efficiencies – Control and management problems – Social issues – Cropping pattern and water productivity optimization – Re-use of drainage water.

07 05 635 Computer Applications in Water Resources

Programming the following topics: Calculation of groundwater quantity and Artisan pressure. Rainfall intensity and surface runoff. Water budget. Analysis of pumping test data.

07 05 636 Water Storage Projects

Site selection. Hydrological studies. Analysis of expected water requirements. Variation of area and volume with elevation. Reservoir components. Reservoir management. Storage losses. Expected sedimentation. Hydraulic and Environmental studies.

07 05 711 Flash Floods Hydrology and Protection Methods

Introduction. Factors affecting flash floods. Studies required for flash floods. Estimation of maximum discharge and resulting volume. Protection methods. Utilization of flash flood water. Environmental impact of flash floods.

07 05 712 Canal Falls Structures



Introduction. Importance of studying canal falls. Land topography. Hydraulics of water falls. Design of different canal falls structures: vertical, notched, stepped, glacis falls, or chute falls. Dissipation of excess water energy and protection against D/S scour.

07 05 713 Improvement of Irrigation Water Control and Management Systems

Urgent need for conservation of irrigation water. Operational problems of the existing system. Improvement objectives and methodology. On-demand irrigation with D/S control. Mathematical modeling for unsteady flow in canals. Canal night storage. Flow-control structures. Design of different elements. Rehabilitation of irrigation network. Use of information technology for irrigation management. Evaluation of the outcome of some improvement projects.

07 05 714 Design and Execution of Agricultural Drainage Networks

Benefits of agricultural drainage. Causes of water logging. High salinity problems in agricultural lands. Preliminary field studies. Drainage duties. Design and maintenance of surface and covered drains networks. Specifications of materials. Efficiency of drainage networks and inspection methods. Hydraulic structures of drainage networks. Vertical drainage using wells. Environmental impacts of agricultural drainage projects.

07 05 715 Shore Engineering and Protection

Mechanics of wave motion. Surf zone waves and currents. Water levels and astronomical tides. Coastal sediment process. Shore protection planning and design process. Hydrodynamics of tidal inlets. Engineering analysis. Case study.

07 05 716 Water Hammer (WH) in Pipelines and Protection Methods

Causes. WH due to instantaneous change in velocity. Continuity and Momentum equations for general conditions. Boundary conditions. Numerical solutions. WH resulting from operation of pumps. Transient cavitation and column-separation. Methods of controlling WH. Computer applications.

07 05 721 Water Environment Engineering

Surface and ground water standard specifications. Pollution point source and distributed sources. Dissolved oxygen and pathogens. Sediment oxygen demand. Pollution of surface. Pollution of ground water. Protection from pollution and governing laws. Sea water intrusion. Reuse of drainage water. Environmental studies for irrigation and drainage projects. Sea level rise

07 05 722 Hydrological and Hydraulic Studies of the River Nile

A) Hydrological study of the Nile basins and its tributaries:

The southern basin. The eastern basin. The western basin. Victoria Nile. El-Gabal and El-Zaraf rivers. The White Nile. The Blue Nile. The Main Nile in Sudan and Egypt.



B) Hydraulic Study:

Hydraulic sections and slopes. Discharge regime equations. Erosion and sedimentation.

C) Flow control and hydro-power generation projects.

07 05 723 Integrated Management (IM) and Sustainable Development (SD) of Irrigation Water Resources

(IM) and (SD) concepts, principles and objectives. Evaluation of available water resources for irrigation. Demand management. Engineering and environmental studies. Economical, social and organizational studies. Field monitoring and building a data base. Case studies for application of IM and SD of irrigation water in Egypt (North Delta, Oases, North coast and Sinai, newly reclaimed lands, irrigation water conservation in the Delta and Wady). Applications in other countries.

07 05 724 Design and Construction of Canal Lining

Types of canal lining: Concrete, membrane, rocks, gabions, or earth lining. Preliminary field investigations. Design of lined canals. Reducing ground water pressure on lining. Lining construction. Seepage losses from lining. Economics of lining. Maintenance of lining. Practical applications and field visits.

07 05 725 Use of Pipe Systems for Irrigation Networks

Comparison between pipe systems and open channels for conveyance and distribution of irrigation water. Design guidelines to account for varying requirements and management method of irrigation water. Hydraulic design and water hammer protection. Design specifications for low-pressure concrete and plastic pipes. Pipe materials and specifications. Structures for transition from open channel to pipeline or vice versa. Economic and environmental study.

07 05 726 Dewatering Systems for Irrigation and Drainage Structures

Sources of shallow and deep groundwater. Different systems for lowering water table. Estimating design discharge. Design of shallow well systems. Design of deep well systems. Economics of different systems.

07 05 727 Stability of Canals and Drains Embankments

General features of earth embankments. Field investigations. Seepage control. Embankment design and stability analysis. Construction methods of earth embankments. Field measurements and maintenance.

07 05 728 Groundwater Hydrology



Introduction. Fundamentals of groundwater hydrology. Well flow systems. Measurements of aquifer parameters. Groundwater flow system analysis and models. Groundwater quality. Groundwater contamination. Groundwater in Egypt.

07 05 729 Hydraulics of Wells

Introduction. Properties of groundwater aquifers. Abstraction of groundwater. Water wells. Steady radial flow to wells. Unsteady radial flow to wells. Leaky aquifers.

07 05 730 Improved Irrigation Structures

Introduction. Continuous flow. Intermittent (rotational) flow. Upstream control structures. Downstream control structures. Head regulators. Distribution structures. Control structures. Tail escape. Design and stability of improved canals sections. Design of conveyance structures.

07 05 731 Fluid Mechanics

Equations of motion for ideal fluids. Complex potential and complex velocity. Vortex motion. Fluid thrust. Flow through porous medium: Governing equations, Images concept for flow fields, seepage under dams. Turbulent flow and boundary layer. General forms of continuity, energy and momentum equations for real fluids. Laminar, turbulent and transitional flows. Diffusion process in lakes and estuaries.

07 05 732 River Engineering and Sediment Transport

Sediment characteristics. Incipient motion of sediment particles. Flow regimes. Resistance to flow and velocity distribution in alluvial streams. Total load transport. Stream bed variation in alluvial streams. Lateral migration and sediment transport of alluvial streams. River training and bank protection. River morphology.

07 05 733 Statistical Methods in Hydraulics and Hydrology

Fundamentals of engineering statistical and frequency analyses. Statistical applications to the analysis of hydrological and hydraulic data and experimental results.

07 05 734 Computational Hydraulics

Finite difference method. Finite element method. Introduction to FORTRAN language. Mathematical formulation of physical processes. Solution techniques and their evaluations. Seepage through saturated and unsaturated soils. Flow simulation in natural rivers. Model calibration. Modeling of flow regulation in irrigation canals and power cascades. Movable bed models. Pollutant transport models. Seepage underneath hydraulic structures models.

07 05 741 Finite Element Method in Hydraulic Structures



Review of mathematical background. Variational formulations and applications. Local and global finite element equations. Application of boundary conditions. Computer applications.

07 05 742 Unsteady Flow in Open Channels

Introduction. Basic equations. Method of characteristics. Propagation of simple waves, kinetic wave and diffusion wave problems. Application to dam break wave. Numerical modeling.

07 05 743 Pipe Network Systems

Economical design of discharge and gravity pipe lines. Pump selection for simple and complex networks. Cavitation. Different valves for pipe lines. Water hammer in pipelines. Protection from water hammer hazards.

07 05 744 Design and Maintenance of Wells

Groundwater aquifers. Groundwater exploration. Ideal design of wells. Wells screen and depth. Drilling methods. Well development. Corrosion and incrustation. Well maintenance.

07 05 745 Wave Hydraulics

Linear wave theory. Wave properties. Higher order theories. Deep water waves. Shallow water transportation. Surf zone dynamics. Coastal sediment transport. Wave modeling. Wave effects on shores and protection structures.

07 05 746 Advanced Analysis of Irrigation and Drainage Systems

Estimation of crop-water requirements. Storage of water for irrigation. Irrigation wells. Surface, sprinkler and trickle irrigation systems. Conveyance and pumping irrigation and drainage water. Optimization of irrigation water use. Agricultural drainage. Salinity problems. Water hammer problems in irrigation pipes. Economic studies of irrigation and drainage projects

07 05 747 Water Resources Pollution (Advanced)

Types and sources of pollutants. Variation of pollutants nature and concentration due to diffusion, dispersion and convection. Pollution of rivers and lakes. Pollution of wells and ground water. Pollution of reservoirs. Engineering solutions for water pollution problems. Analysis of existing systems for water quality management. Study of the Nile river pollution problem.

07 05 748 Special Course

Selected topics which enrich student's thesis research, based on his/her supervisor's advice.



07 05 749 Seepage in Hydraulic Structures

Introduction. Different kinds of seepage. Seepage characteristics. Effect of seepage on hydraulic structures. Methods of analysis (analytical, approximate, empirical, experimental, and numerical). Design of gravity hydraulic structures against seepage effects. Design of earth embankments against seepage effects.

07 05 750 Local Scour behind Hydraulic Structures

Introduction. Phenomenon of local scour downstream hydraulic structures. Experimental modeling of local scour. Calculation of local scour. Measures for local scour protection. Design of hydraulic structures for local scour and tail erosion.

07 05 751 Ground Water Modeling

Types of groundwater aquifers. Aquifer characteristics and measurement methods. Groundwater exploration. Flow systems to wells. Mathematical modeling. Governing equations. Numerical modeling. Groundwater code.

07 05 752 Hydraulics of Pumping Stations

Types of pump stations. Hydraulic design of pumps. Hydraulics of suction and delivery pools. Hydraulics of different pipes. Seepage underneath and around the structure. Hydraulics of related and protection structures.

07 05 753 Hydraulics Measurements and Modeling

Methods of measuring and computing. Discharge, pressure, velocity and different water levels in the laboratory and in the field. Means of measuring hydraulic properties behind hydraulic structures. Hydraulic models in the laboratory. Numerical and mathematical hydraulic models.

07 05 811 Advanced Hydraulics

Equations of conservation of mass and energy. Introduction to mixing and dispersion in natural waterways. Turbulent shear flow. Basic theory of diffusion. Advective diffusion. Turbulent dispersion and mixing in natural systems. Mixing in estuaries. Unsteady flow in open channel. Interaction between flowing water and its surroundings. Analytical and numerical models. Initial and boundary conditions. Programming of some hydraulic applications. Application of some commercial software.

07 05 812 Advanced Topics in Water Resources Engineering

Critic review and summary of update scientific researches and papers, dealing with one or more topics, in co-ordination with the supervisor. A seminar presentation evaluated by the department faculty is required.



07 05 813 Water Basin Hydrology of Rivers

Climate parameters affecting precipitation. Stochastic analysis. Catchment boundaries. Study of soil and vegetative cover. Estimation of evaporation and seepage losses. Marshes losses. Estimation of surface runoff and runoff coefficient. Water budget for lakes. Measurement methods and expected errors. Schemes to increase annual water supply.

07 05 821 Estuary Hydraulics

Estuary classifications. Estuary hydrodynamics. Turbulent mixing and dispersion in estuaries. Effect of engineering works on salinity intrusion. Physics of estuary pollution. The use computer in estuaries hydraulic modeling.

07 05 822 Hydro Informatics

Data driven investigations in hydrology. Managing and accessing large datasets. Data communication. Data processing and analysis. Computer Analysis.

07 05 823 Pipe Network Systems (Advanced)

Field studies and planning. Statistical studies. Selection of pipe type. Hydraulic and economic analyses using computer software. Valves and accessories for pipelines. Protection of pipes against corrosion and water hammer. Construction execution methods. Application study.

07 05 824 Water Management of Coastal Environment

Climate parameters. Rainfall analysis. Surface and ground water sources. Water desalination. Wells characteristics and distribution. Storage of water. Sea water intrusion. Soil and water salinity problems. Pollution of coastal lakes. Water budget. Economic study.

07 05 825 Economical, Environmental and Social Studies for Water Projects

Monetary funding for water projects. Annual funding and inflation rate. Cost sharing between government and investors. Expected annual return. Effect of natural, local and international changes. Environmental impact of the project. Social study. Evaluation of different alternatives of the project.

07 05 826 Statistical Analysis in Water Resources Engineering (Advanced)

Introduction. Time series. Basic concepts of probability curves. Mathematical models of probability. Length of records. Selection of design event. Determination of permissible risk. Flood frequency. Probability and stochastic analyses.

07 05 827 Design of Irrigation Structures (Advanced)



Site planning. Basic economical concepts. Different methods of structural analysis. Use of commercial software in the design of irrigation structures. Applications.

07 05 601 Diploma Project (Irrigation Structures)

07 05 602 Diploma Project (Water Resources Engineering)

07 05 701 M.Eng. Scientific Report in Irrigation Engineering and Hydraulics

For the scientific report, three alternatives are suggested:

First Alternative:

A theoretical study of a scientific problem in the field of irrigation and hydraulics is to be carried out. The report should include:

- i- An introduction which outlines the suggested problem and its importance in field applications,
- ii- A literature review for published papers dealing with this problem,
- iii- A proposal for the study outlines and suggested theoretical or experimental solution,
- iv- Computer applications for some similar problems.

Second Alternative:

"State of the Art" report about a selected topic of realistic significance in the field of irrigation and hydraulics is to be prepared. It should contain student's comments, comparisons and expected return under local conditions. The student should get copies of main references of his report, with minimum of (15) reviewed papers.

Third Alternative:

It is generally similar to the first alternative but its main objective is "Study and analysis of field data related to the problem". Scientific background of the problem should be clearly identified.

07 05 705 M.Sc. Thesis in Irrigation Engineering and Hydraulics

07 05 801 Ph.D. Dissertation in Irrigation Engineering and Hydraulics